REVIEW OF THE CALFED WATER-USE EFFICIENCY COMPONENT TECHNICAL APPENDIX

Report to the United States Department of the Interior
Bureau of Reclamation
Grant No. 8-FG-20-16250

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June 30, 1998

E-017882

EXECUTIVE SUMMARY

Much of the fresh water that is used by southern California cities and Central Valley farmers passes first through the Sacramento-San Joaquin Delta (the "Delta") system of California. Over the past 50 years, the health of this complex series of wetlands and ecosystems has declined substantially as more and more water has been shipped south. Concerns have also been raised about the reliability of future water supplies from this region because of changing demographics and demands. For several years the CALFED Bay-Delta Program ("CALFED") has been working to develop a comprehensive plan to address these concerns and to restore ecological health and improve water management in the Delta. Because of the comprehensive nature of CALFED and because decisions in this area affect water users throughout the state, the CALFED process has become central to all California water planning and management.

Phase II of CALFED has been devoted to analyzing and refining three alternative solutions to Delta problems with the goal of eventually identifying a preferred alternative. Common to all three alternatives are certain elements to ensure that California's water supplies are used efficiently. One of these is the Water Use Efficiency Component (WUEC). In March 1998, CALFED staff released a draft of the WUEC Technical Appendix, as part of the draft Programmatic EIS/EIR. At that time, the U.S. Bureau of Reclamation contracted with the Pacific Institute to perform an independent review of that Component to explore assumptions, data, and conclusions. A final draft of the review was to be completed by the end of the formal public comment period, initially scheduled for June 1, 1998 and subsequently extended to July 1.

Substantial efforts on the part of CALFED staff and California water stakeholders have gone into the CALFED program in an effort to reach agreement on how to move forward with the debate over California water policy and management. The comments in this review should be seen as an effort to further strengthen the CALFED effort and to improve the quality of the information that will ultimately go into any decision about a preferred alternative.

The Numbers Matter

Before describing our specific concerns with the WUEC, we wish to note that the "numbers matter." By this we mean that despite many existing uncertainties about the potential for demand management to both reduce anticipated future demands and to supply new water, the numbers used in the analysis directly affect outcomes, conclusions, and long-term California water plans. Reiterated throughout the CALFED document is the statement that the information and the analysis in the WUEC are not intended to be used as planning recommendations. CALFED staff have noted that CALFED's objective is to reduce the mismatch between future supply and demand and to focus on supply reliability rather than to quantify demand. This argument is used to downplay the importance of the actual estimates of potential for the conservation options. This casual approach toward the numbers biases the choice of a preferred alternative by not providing a full and accurate account of the potential for demand management to reduce the discrepancy between supply and demand or the relative benefits and costs of demand management compared to developing new supply. The numbers matter, and we urge

CALFED staff to continue their efforts to correct incorrect data, identify gaps in data, and refine estimates as new information is developed.

Major Findings

The concerns we raise about methods and specific data sets are important. Errors in methodology and data affect CALFED modeling efforts to evaluate impacts (the ongoing impact analyses) and they form the basis for the Economic Risk Model assumptions used to evaluate costs and benefits of various supply options.

Below we offer a summary of our more detailed comments, followed by specific recommendations for ways to improve the WUEC and improve the analysis of CALFED alternatives. In addition to the recommendations scattered throughout the assessment, some detailed recommended word changes are listed in Appendix A.

1. Methodological Problems

- There can be no single estimate of the potential for water-use efficiency improvements. Each CALFED alternative comes with a different set of assumptions, physical structures, and costs. These characteristics will determine which water-use efficiency components are most cost-effective, which are applicable in different regions, and ultimately, how much future demands for water in California can be reduced or modified. This point should be emphasized at the beginning of the WUEC.

- There is a misrepresentation in the CALFED WUEC about the definition and role of water-use efficiency improvements. In the WUEC, such improvements are incorrectly treated as supply options in the water balance, rather than as direct reductions in future demand. This leads to grossly inflated estimates of future water needs.

- Basic economic principles receive inadequate treatment and attention throughout the report. Both water demand and supply levels are projected independent of costs, prices, subsidy considerations, and market forces, and are therefore incomplete and unrealistic. In the one case where economic costs of demand management options are presented, the estimates are based on incorrect and incomplete data from DWR.

- The benefits of promoting water conservation in urban areas are understated and misinterpreted. A decrease in per-capita urban water demand due to water-use efficiency improvements will lead to direct reductions in the projections of future demand, will extend the supply available to meet future demand, and will have a wide range of other indirect water quality and ecosystem advantages. Total applied water reductions should be counted as reductions to future demand. A wide range of potential improvements that have been left out should be brought into the assessment.

- The benefits from improving water use in agriculture are understated and incorrectly described. These benefits include decreases in agricultural applied water needs, increased availability of water for other agricultural or non-agricultural uses, and

improvements in instream flows and quality. Great uncertainties about total potential remain, but several methodological and data flaws should be corrected.

- Evaporation and transpiration from agriculture are treated as a single factor with a fixed value. They must be considered separately. Real savings from reductions in nonproductive evaporative losses are not evaluated in the WUEC, leading to an underestimate of the potential savings in agriculture. Insufficient consideration is given to ways of reducing transpiration.

- The WUEC incorrectly assumes that no landscape improvements down to 0.8 ETo are evaporative losses. The landscape conservation literature suggests that substantial reductions in consumptive losses are possible. The analysis also underestimates the fraction of residential landscape that can be reduced to 0.6 ETo, overestimating future outdoor landscape water needs.

2. Data and Information Gaps

- The greatest problem with the WUEC Technical Appendix is its reliance on the demand estimates and analysis of the California Department of Water Resources draft Bulletin 160-98. As noted here and elsewhere, the draft Bulletin 160-98 contains major methodological and data flaws. CALFED significantly improves on Bulletin 160-98 water-use efficiency estimates, but adopts some major flaws from that document. These flaws lead to overestimates of future water demand and underestimates of the potential for cost-effective water-use efficiency improvements by the year 2020 in both the urban and agricultural sectors. These errors are important: they drive the CALFED modeling efforts to evaluate impacts (the ongoing impact analyses) and they form the basis for the Economic Risk Model assumptions used to evaluate costs and benefits of various supply options.

- The baseline data on water use in California are adopted from the draft Bulletin 160-98. It now appears that this baseline significantly overestimates current demand for water. This overestimate, in turn, directly leads to a significant overestimate of future baseline demand for water and therefore an exaggeration of the gap between supply and demand. As noted above, the supply/demand numbers drive much of the rest of the impact and assessment work of CALFED.

- No satisfactory water balance of supply and demand is provided within each region. This makes it impossible to compute regional water reuse factors, total applied water, or consumptive versus non-consumptive uses.

- The potential for urban demand management appears to ignore a wide range of existing cost-effective technology and policies. Detailed residential end-use studies suggest that even the current generation of conservation options can reduce indoor and outdoor end use to well below the levels assumed by CALFED. The potential for new and developing technologies over the next 22 years is excluded entirely.

- The value and scope of improvements in irrigation technology are underestimated. More quantitative analysis is needed of decreases in evaporative losses, reduced energy and economic costs to farmers of overapplication, and improvements in water quality.

- The WUEC discussion of the "costs of conservation" options is inadequate; the data used are inaccurate and incomplete. The single measure used – cost per acre-foot – is inappropriate. Other measures, including benefit/cost ratios and simple payback periods are also important indicators of costs. The data used reflect the upper end of current estimates, but not the lower end, and they are based on an incomplete reading of the literature by DWR. Detailed recommendations are provided below.

In addition to the aforementioned problems, the following gaps in the data essentially make it impossible to analyze the CALFED document in proper detail. Many of these flaws are not the fault of CALFED – in many cases no good data actually exist. In order to make intelligent decisions, however, much of this information will have to be made available.

Residential landscape area is highly uncertain;
Residential landscape water use is poorly understood or measured;
Distribution of residential water-using appliances, by type and use, is not known;
Distribution of irrigation technology by type and crop, is not known;
Statewide and regional values for agricultural water-use efficiency are not measured or separated into its component parts: evaporation and transpiration;
Agricultural water-use efficiency, as a function of irrigation technology, is incompletely understood;
Economic costs of conservation options are poorly understood and quantified;
The water balance of major regions has not been adequately done;
The implications for water quality of conservation options has not been explored analytically.

Great uncertainties still remain about the potential for demand management and improvements in water-use efficiency in California. The magnitude of this potential depends on water prices, rate designs and structures, existing and developing technology, public opinion and preferences, and policies pursued by water agencies and managers. Despite these uncertainties, there is a very high likelihood that appropriately designed water-use efficiency programs will generate large, cost-effective improvements in water-supply reliability, water quality, and ecosystem health. The framework and implementation of these programs have yet to be adequately addressed by CALFED.

Many of the uncertainties associated with the water-use efficiency programs can be reduced with modest investments in data collection and analysis. Until proper comparisons are made between demand-management potential and new supply infrastructure, large investments in new water-supply systems should be delayed, since they may prove economically and environmental unjustifiable.